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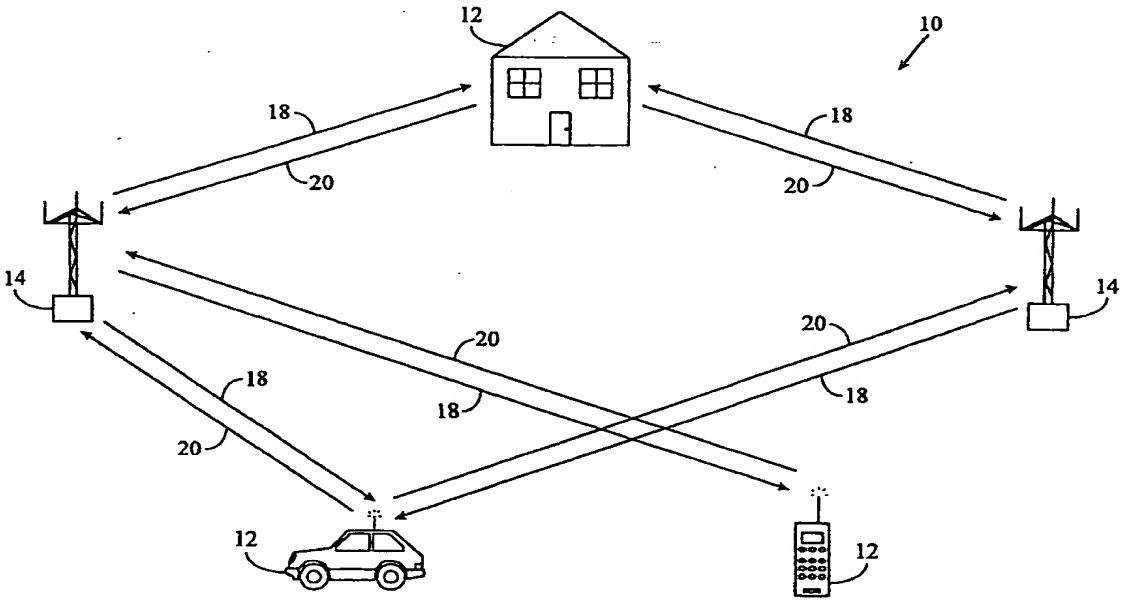

(57) Abstract

When an incoming call is received or an outgoing call is placed, a phone number associated with the call is identified. The phone number is compared to a set of phone book entries corresponding to subscriber–designated phone entries and special phone book entries. If the phone number is identified as corresponding to a special phone book entry, call processing continues according to a field type designated by the selected phone book entry.

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SPECIAL PHONE BOOK ENTRIES

BACKGROUND OF THE INVENTION

I. Field of the Invention

This invention relates generally to wireless communication systems. More specifically, the invention relates to call processing in a wireless communication system.

II. Description of the Related Art

Wireless systems are becoming a fundamental mode of telecommunication in modern society. As wireless systems continue to penetrate deeper into the telecommunications market, the demand for user features will only continue to increase. Special user features allow individual carriers to distinguish their services over other wireless carriers. As such, the user features continue to be an important part of a wireless communication system.

Figure 1 is a block diagram showing a typical modern wireless communication system 10. The system is comprised of a series of base stations 14. A set of remote units 12 communicate with the base stations 14. The remote units 12 communicate with the base stations 14 over a forward link channel 18 and a reverse link channel 20. Figure 1 shows a variety of types of remote units. For example, Figure 1 shows a hand-held portable telephone, a vehicle mounted mobile telephone and a fixed location wireless local loop telephone. Such systems offer voice and data services. Other modern communication systems operate over wireless satellite links rather then through terrestrial base stations.

When a subscriber wishes to place a call, typically he enters a telephone number into the keypad of his remote unit 12. A message is sent over the reverse link channel 20 to the base station 14 and a bi-directional communication channel is established between the base station 14 and the remote unit 12. In a similar manner, when a call arrives at the base station 14

for the remote unit 12, the base station 14 sends a message to the remote unit 12 over the forward link channel 18. The remote unit 12 responds to the message and bi-directional communication is established between the remote unit 12 and the base station 14.

In some instances, it is advantageous to provide additional information to the subscriber upon call origination or call receipt at the remote unit 12. In addition, some types of calls should be handled differently by the system 10 than others.

Some prior art systems allow the subscriber to enter phone book entries into the remote unit. Using the phone book entries, the subscriber can identify commonly used telephone numbers and designate them with a corresponding text entry. For example, if a salesman places several calls a day to his home base, he makes a phone book entry which designates his home base. When he wishes to call home base, he enters a telephone number or a set of shortcut keystrokes in order to place a call to the home base. The telephone number is compared with the phone book. The phone book comprises a subscriber-designated text field corresponding to information that will be displayed during the call connection. Typically a liquid crystal display (LCD) shows the text "HOME BASE." Likewise, when an incoming call is received, if caller identification is available, the calling number is compared to the phone book entries. If a corresponding phone book entry is found, the display shows the corresponding text entry. For example, if a regular customer of the salesman calls, the display shows the subscriber designated text "BOB'S FISH EMPORIUM."

These subscriber designated text messages are each associated with standard voice or data telephone connections. In some instances, the subscriber places or receives a special, nonstandard connection. For example, the subscriber can place an emergency call which triggers special call processing procedures. These specials calls are often associated with an industry standard phone number such as 911. However, these standard phone numbers are not universally accepted and can vary from country to country. The carrier needs to remain in control of the calls which are designated as emergency calls

because the special call procedures associated with emergency calls consume more resources than standard calls. For this reason, it is not practical to allow the subscriber to designate certain phone numbers to correspond to nonstandard connections. In addition, the infrastructure equipment is typically designed to reject connections which are designated as emergency calls unless the phone number corresponds to a known emergency phone number. Thus, if the subscriber attempts to enter his own emergency number, the remote unit may enter an inconsistent state when the designated number is dialed. Because the phone numbers which trigger these nonstandard connections can be customized locally, it is not practical to hard code these numbers into the remote units.

Therefore, there is a need in the industry to develop a special means of call processing for nonstandard connections.

SUMMARY OF THE INVENTION

When an incoming call is received or an outgoing call is placed, a phone number associated with the call is identified. The phone number is compared to a set of phone book entries corresponding to subscriber-designated phone book entries and special phone book entries. If the phone number is identified as corresponding to a special phone book entry, call processing continues according to a field type designated by the selected phone book entry. For example, the call can be an emergency call or an over-the-air service provisioning call. In one embodiment, the selected special phone book entry is stored in the phone book during factory test or setup. In an alternative embodiment, the selected special phone book entry is stored in the phone book during the over-the-air service provisioning call.

BRIEF DESCRIPTION OF THE DRAWINGS

The features, objectives, and advantages of the invention will become more apparent from the detailed description set forth below when taken in conjunction with the drawings wherein like parts are identified with like reference numerals throughout and wherein:

Figure 1 is a block diagram showing a typical modern wireless communication system.

Figure 2 is a representational diagram showing a set of phone book entries in accordance with the invention.

Figure 3 is a flow chart showing call processing in accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

Figure 2 is a representational diagram showing a set of phone book entries in accordance with the invention. The phone book itself can be an area of memory designated to store the phone book entries. With reference to Figure 2, it is seen that in addition to the subscriber-designated phone book entries, the phone book comprises several special phone book entries. These special phone book entries are similar to the subscriber-designated phone book entries with the exception that the special phone book entries each have a corresponding type field. The type field can be used to specify a special type of call processing associated with a particular type of call. For example, there is an industry standard practice which designates the phone number *22803 as an over-the-air service provisioning (OTASP) telephone call. When a call is received from this number, the phone enters a special service processing routine. During an OTASP call, the remote unit responds to the incoming signals as if they were commands rather than passing them indiscriminately to the voice or data output.

Another example of such a call is an emergency call. When a subscriber dials the digits 911, the phone may enter a special emergency call processing routine. For example, in one embodiment, the emergency call processing allows the subscriber to infinitely retry to connect with the network even if no service is available such as in a manner described in co-pending U.S. Patent Application Serial No. __/___,___ entitled "System and Method for Facilitating Wireless Call Connections in Emergency Situations" assigned to the Assignee hereof and incorporated in its entirety herein by this reference. In addition, in

one embodiment, the remote unit automatically answers the next telephone call received after originating an emergency call so that the caller may monitor the environment detected by the phone even if the user is incapacitated and unable to answer the call. Such a system is described in U.S. Patent Application Serial No. __/___,___ entitled "System and Method for Automatically Answering Incoming Emergency Calls to a Wireless Phone" assigned to the Assignee hereof and incorporated in its entirety herein by this reference.

In addition to these industry standard phone numbers, each carrier may wish to designate other telephone numbers to prompt special call processing. According to the invention, each of these special phone book entries has a corresponding type which designates any special call processing associated with an incoming or outgoing call to the specified number. For example, a carrier may wish to designate a very short sequence such as *2 to designate a subscriber-initiated OTASP call. In this way, the carrier service is customized and the subscriber is not required to memorize a long series of numbers. Likewise, in some countries, the emergency number is different than the U.S. industry standard 911. A special phone book entry can be used to correlate an emergency number which does not conform with the U.S. industry standard with the emergency call processing routines.

In one embodiment, these special phone book entries are stored in the phone during the manufacturing process such as during factory test or during a field activation process using techniques well known in the art. Alternatively, or in addition, these special phone book entries are stored using well known OTASP techniques which are performed while the remote unit is deployed in the field. In yet another embodiment, these special phone book entries are stored using product support tools in the service providers service center. It is important that the system subscriber does not have the capability to enter, remove or modify any of the special phone book entries. For example, it would not be advantageous to allow a subscriber to enter a private telephone number designated as an emergency number.

Operation of the system in accordance with one embodiment of the invention can be described with reference to Figure 3. In particular, flow begins

in start block 30. Block 32 determines whether an incoming call has been received. If a call has been received, flow proceeds to block 34 which determines whether caller identification information is available. If so, flow continues on to block 38. If not, flow continues back to block 32.

If no incoming call is received in block 32, flow moves to block 36 which determines whether an outgoing call has been placed. If not, flow continues back to block 32. If an outgoing call has been placed, flow continues to block 38.

Upon entering block 38, the identity of an outgoing or incoming call is known. Block 38 determines whether the phone book contains a corresponding entry. If not, flow continues back to block 32.

If a corresponding entry is available in the phone book, flow continues to block 40. Block 40 determines whether the entry is a special entry or a subscriber-designated entry. If the entry is a special entry, flow continues to block 44 where call processing according to the call type, is executed. If the entry does not correspond to a special entry, flow continues to block 42 where standard phone operation is executed. For example, the corresponding text in the phone book is displayed in the LCD of the remote unit. After execution of blocks 42 or 44, flow continues back to block 32.

Upon examination of the above description, a myriad of alternative embodiments will be readily discernible by those skilled in the art. For example, the type field could designate any manner of connection type besides OTASP or emergency. For example, certain network modem pools require a phone connection placed using analog modulation techniques such as frequency modulation (FM) techniques rather than digital modulation techniques such as code division multiple access (CDMA) or time division multiple access (TDMA) techniques. These modem pool numbers can be added as special phone book entries so that when these numbers are dialed, the phone automatically enters analog mode operation before beginning call origination procedures.

In another embodiment, certain numbers can be designated as priority numbers. When a subscriber locks his phone, a special code must be entered into the phone before the phone will place a call. However certain phones, such

as emergency numbers are associated with special routines which over-ride the locking mechanism. For example, emergency routines typically override the locking mechanism and allow a call to be place even when the phone is locked. A special phone book entries can be used to designate other priority numbers which are associated with special routines which override the locking mechanism. For example, a carrier my designate a network operator phone number which is associate with a routine that overrides the locking mechanism so that a subscriber who has forgotten his unlocking code can place a call to his service provider to unlock the phone.

Typically, the invention is implemented in software running on a digital signal processor (DSP) or is embodied in hardware such as a field programmable gate array (FPGA) or in an application specific integrated circuit (ASIC) or in memory controlled by a microprocessor. The invention may be embodied in a series of processes which carryout the steps shown in Figure 3.

The invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiment is to be considered in all respects only as illustrative and not restrictive and the scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

WHAT IS CLAIMED IS:

CLAIMS

1. A method of call processing comprising the steps of:

identifying a phone number associated with an incoming or outgoing call;

comparing said phone number to a set of phone book entries corresponding to subscriber designated phone book entries and special phone book entries;

identifying said phone number as corresponding to a selected special phone book entry; and

processing said incoming or outgoing call according to a type field designated by said selected special phone book entry.

2. The method of call processing of Claim 1, wherein said incoming or outgoing call is an emergency call.

3. The method of call processing of Claim 1, wherein said incoming or outgoing call is an over-the-air service provisioning call.

4. The method of call processing of Claim 1, wherein said selected special phone book entry is stored during the manufacturing process.

5. The method of call processing of Claim 1, wherein said selected special phone book entry is stored during over-the-air service provisioning.

6. The method of call processing of Claim 1, wherein one or more other special phone book entries has the same type as said selected special phone book entry.

7. The method of call processing of Claim 1, wherein said selected special phone book entry is specific to a first system carrier.

8. A call processing apparatus comprising:

means for identifying a phone number associated with an incoming or outgoing call;

means for comparing said phone number to a set of phone book entries corresponding to subscriber designated phone book entries and special phone book entries;

means for identifying said phone number as corresponding to a selected special phone book entry; and

means for processing said incoming or outgoing call according to a type field designated by said selected special phone book entry.

9. A program storage device storing instructions that when executed perform the method comprising the steps of:

identifying a phone number associated with an incoming or outgoing call;

comparing said phone number to a set of phone book entries corresponding to subscriber designated phone book entries and special phone book entries;

identifying said phone number as corresponding to a selected special phone book entry; and

processing said incoming or outgoing call according to a type field designated by said selected special phone book entry.

10. A electronic phone book stored in a remote unit comprising:

a set of subscriber designated phone number entries and corresponding information; and

a set of special entries designated by a system carrier comprising a field designating a phone number and a field designating a call type, wherein an outgoing or incoming call with a phone number corresponding to a special entry is processed in accordance with said call type.

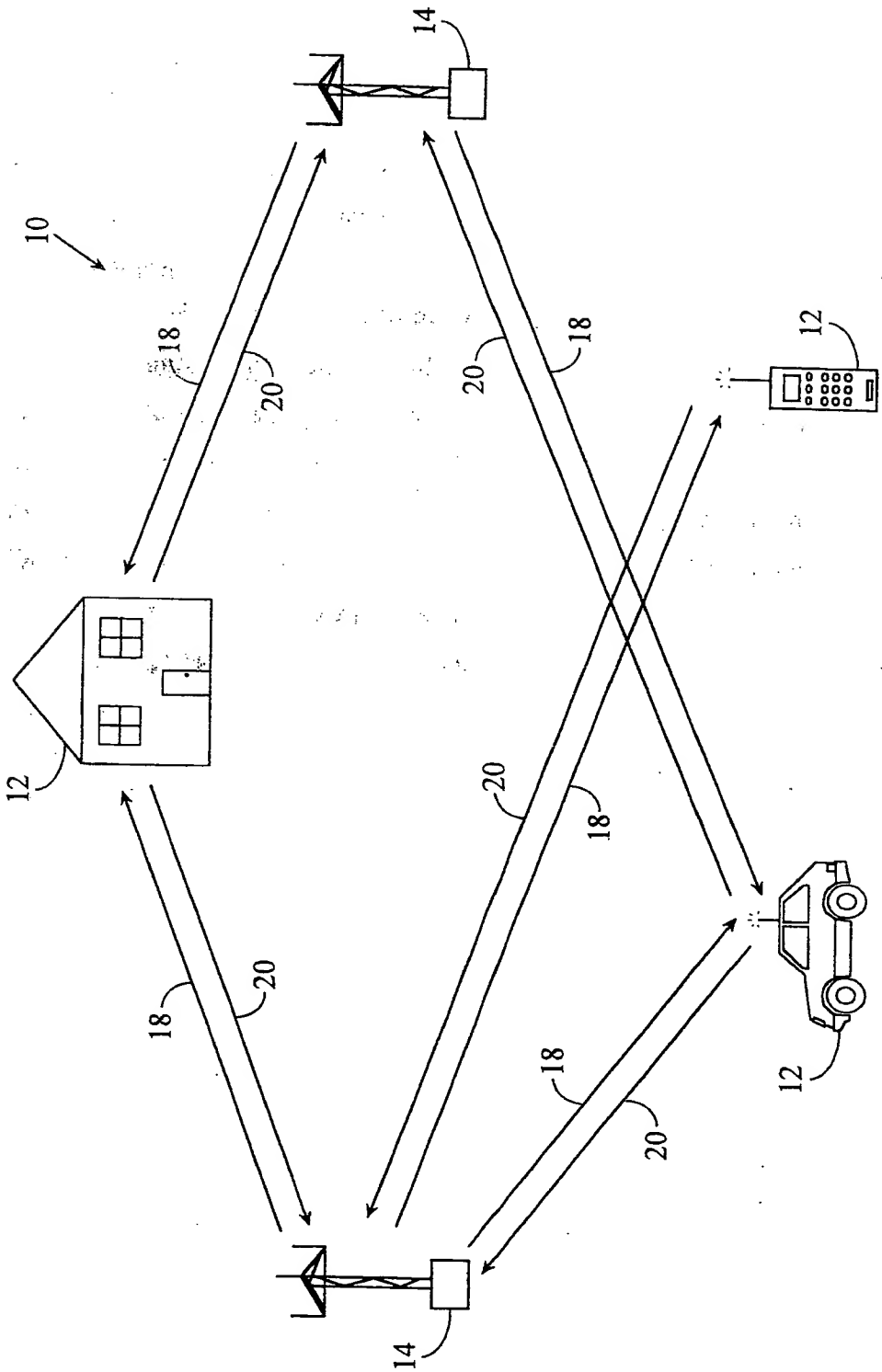

FIG. 1

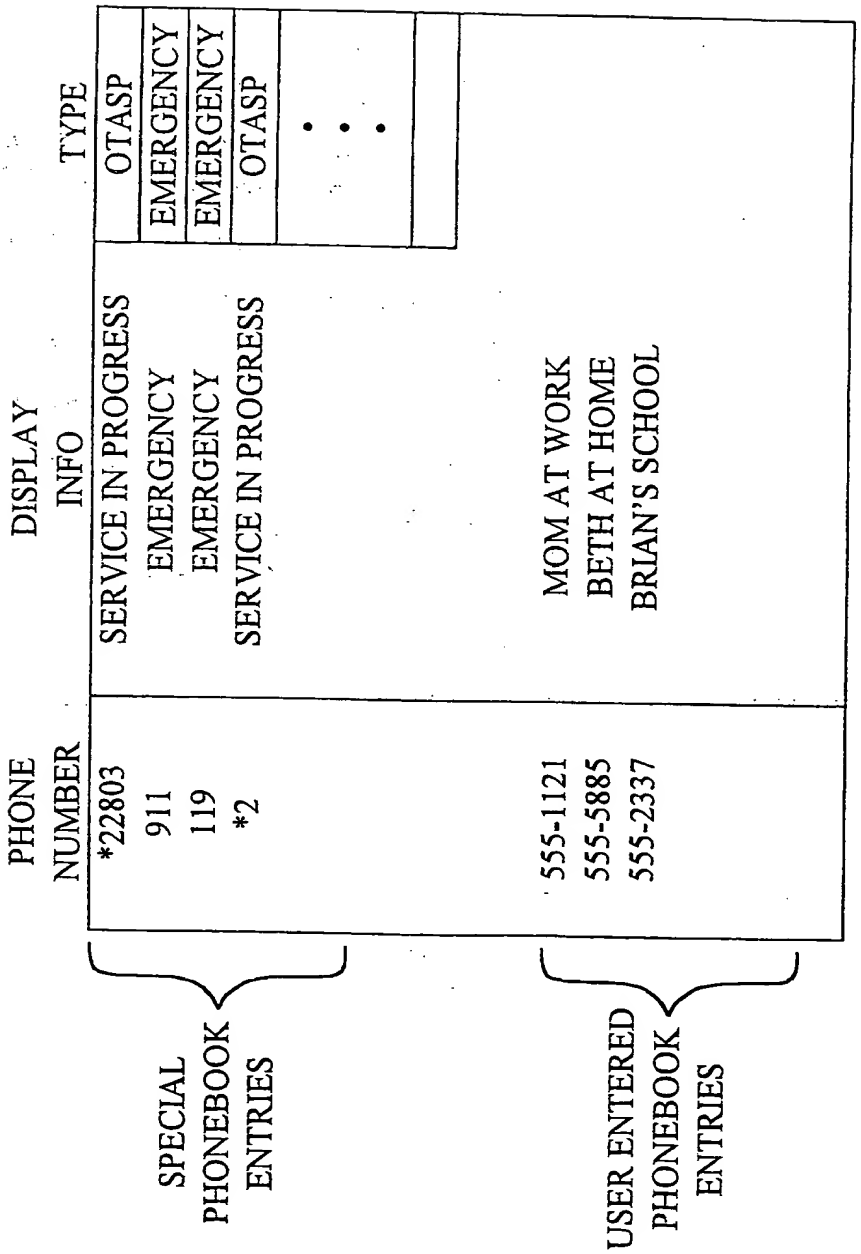
PHONE NUMBER
DISPLAY INFO
TYPE
*22803
SERVICE IN PROGRESS
OTASP
911
EMERGENCY
EMERGENCY
119
EMERGENCY
EMERGENCY
*2
SERVICE IN PROGRESS
OTASP
555-1121
MOM AT WORK
555-5885
BETH AT HOME
555-2337
BRIAN'S SCHOOL
SPECIAL PHONEBOOK ENTRIES
USER ENTERED PHONEBOOK ENTRIES

FIG. 2

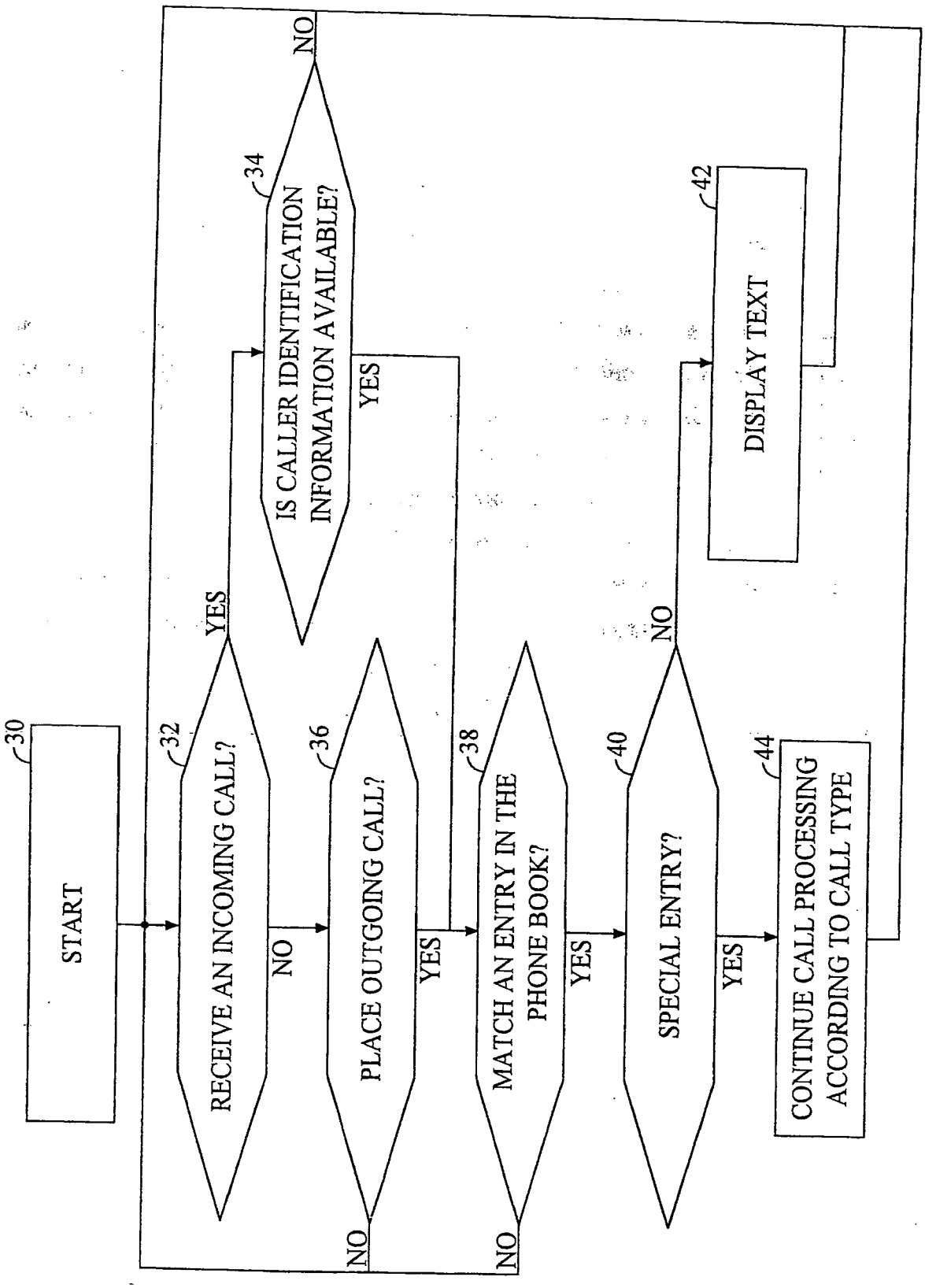
START
30
RECEIVE AN INCOMING CALL?
32
YES
NO
IS CALLER IDENTIFICATION INFORMATION AVAILABLE?
34
NO
YES
PLACE OUTGOING CALL?
36
NO
YES
MATCH AN ENTRY IN THE PHONE BOOK?
38
NO
YES
SPECIAL ENTRY?
40
NO
YES
DISPLAY TEXT
42
CONTINUE CALL PROCESSING ACCORDING TO CALL TYPE
44

FIG. 3